REMARKS

The present invention reduces image quality degradation by filtering only portions of a composite image corresponding to a front image which has not been filtered as opposed to the whole composite image including portions of the composite image corresponding to a back image which has already been filtered. (Pg. 35, ln. 19 – Pg. 36, ln. 1). In the present invention, a texture mapping unit 33 reads from a front texture 21 stored in texture memory 3, pixel information for the front image and sends the information to superimposing/sub-pixel processing unit 35. (Pg. 23, lns. 12 – 18; Fig. 1) A back-image tripling unit 34 reads pixel information for the back image from frame memory 2 and sends the information to superimposing/sub-pixel processing unit 35. (Pg. 23, ln. 23 – Pg. 24, ln. 4; Fig. 1).

Super-imposing unit 41 within superimposing /sub-pixel processing unit 35 then receives the front image and the back image and forms a composite image. (Pg. 25, ln. 12 – Pg. 26, ln. 5). Front-Image Change Detecting Unit 42 and Filtering Necessity Judging Unit 43 receives the pixel information for the front image and determine whether a dissimilarity level of the pixels for the front image exceeds an acceptable threshold and sends the information to filtering unit 45. (Pg. 29, ln. – Pg. 30, ln. 17). Filtering unit 45 then filters only the pixels within the composite image that requires filtering. That is, filtering unit 45 only filters the pixels of the composite image that correspond to the pixels within the front image that exceed the acceptable dissimilarity level and therefore requires filtering. (Pg. 31, lns. 6 – 10; Fig. 3). The composite image that has been filtered is then stored in frame memory 2 and over written over the values stored in frame memory 2 that were read by the back-image tripling unit 34. (Pg. 35, lns. 16 – 18).

The Office Action rejected Claims 1, 9, 11, 15, 17, and 19 under 35 U.S.C. § 103(a) as being unpatentable over *Betrisey et al.* (U.S. 6,738,526).

Betrisey is directed towards displaying small sized text on LCDs by filtering the glyphs and post-cache filtering and/or pre-cache filtering. During post-cache filtering, the glyph display routine 824 has available the intermediate alpha values of the glyphs. To get the intermediate alpha values for the glyph, the glyph is sampled six times per pixel, or two times per sub-pixel as seen in Figures 9 and 10. (Col. 13, ln. 53 – Col. 14, ln. 9) The two values for each sub-pixel are then summed up to produce the intermediate alpha value for each sub-pixel in the glyph. Thus, the glyphs are represented by these intermediate alpha values which are concatenated prior to filtering. Therefore, by the time the filtering is performed, the intermediate alpha values located adjacent to glyph boundaries are defined and available for use during the filtering process. (Col. 14, ln. 28 – 38) This prevents color leakage across glyph boundaries. (Col. 15, lns. 5 – 12)

During pre-cache filtering, the filter routine 813 first samples the glyph 6 times per pixel, or 2 times per sub-pixel as seen in Figure 14. (Col. 13, ln. 45 – 47; Col. 18, lns. 4 – 9, 49 - 52) The two values for each sub-pixel are then summed up to produce the intermediate alpha value for each sub-pixel in the glyph. (Col. 18, lns. 52 – 57). The glyph is then analyzed to determine if padding is necessary. The glyph is padded to add background alpha values having values of zero along each pixel edge where color leakage will occur outside of the glyph as seen in Figure 15. (Col. 18, ln. 58 – Col. 19, ln. 3). Then each character glyph is filtered.

Betrisey does not disclose as specifically claimed in our independent claims such as Claim 1:

> a calculation unit acquiring color values of first-target-range sub-pixels that constitute a front image and are composed of a target sub-pixel and one or more adjacent sub-pixels that are adjacent to

> the target sub-pixel in the lengthwise direction of the pixel rows, and to calculate a dissimilarity level of the target sub-pixel to the one or more adjacent sub-pixels from the acquired color values.

The Office Action cited to Column 18, Lines 58-67 in for the features of the present invention. However, analyzing to determine if there will be "color leakage" into a neighboring graph is not the same as determining whether there is a "color drift" by calculating a dissimilarity level of the target sub-pixel to the one or more adjacent sub-pixels from the acquired color values. *Betrisey* teaches the use of a "box filter" as shown in Figures 10 and 11 in which the intermediate alpha values of adjacent sub-pixels are added up as shown in items 1004 and 1006. "Color leakage" however, occurs due to a process like the use of the "box filter" in which the character "g" may be influenced by the character "o" during the box filtering process. "Color leakage" is shown, for example in the filtered alpha values 1038 where the filtered alpha values are 2, 0, 0 for R, G, and B sub-pixels respectively. Since pixel 936 does not have a character in it, it should have been 0, 0, and 0, but has a non-zero value for the filtered α value for R due to the adjacent pixel 934. (Col. 14, ln. 55 – Col. 15, ln. 11). Thus, the "color leakage" are merely alpha values influenced by adjacent pixels and not "color drift" as determined by dissimilarity levels.

In contrast, "a pixel having a color greatly different from adjacent pixels in the first direction (that is, a pixel at an edge of an image) causes a color drift to be observed by the viewers." (Pg. 2, lns. 4 – 10). In the present invention, "color drifts" can be determined by calculating the dissimilarity level using a distance such as the Euclidean square distance in a color space including α values. The following equation defines an Euclidean square distance L between a point (R_1, G_1, B_1, α_1) and a point (R_2, G_2, B_2, α_2) in a color space including α values.

$$L=(R_2-R_1)^2+(G_2-G_1)^2+(B_2-B_1)^2+(\alpha_2-\alpha_1)^2$$

The color space distance calculating unit 52 calculates the Euclidean square distance for each combination of the five sub-pixels adjacent to aligned in the above-shown order with a sub-pixel at coordinates (x′ ,y′) at the center, using the following equations:

$$L_{1i}=(Rp_{i-2}-Rp_{i-1})^2+(Gp_{i-2}-Gp_{i-1})^2+(Bp_{i-2}-Bp_{i-1})^2+(\alpha_{i-2}-\alpha_{i-1})^2$$
$$L_{2i}=(Rp_{i-2}-Rp_{i})^2+(Gp_{i-2}-Gp_{i})^2+(Bp_{i-2}-Bp_{i})^2+(\alpha_{i-2}-\alpha_{i})^2$$
$$L_{3i}=(Rp_{i-2}-Rp_{i+1})^2+(Gp_{i-2}-Gp_{i+1})^2+(Bp_{i-2}-Bp_{i+1})^2+(\alpha_{i-2}-\alpha_{i+1})^2$$
$$L_{4i}=(Rp_{i-2}-Rp_{i+2})^2+(Gp_{i-2}-Gp_{i+2})^2+(Bp_{i-2}-Bp_{i+2})^2+(\alpha_{i-2}-\alpha_{i+2})^2$$
$$L_{5i}=(Rp_{i-1}-Rp_{i})^2+(Gp_{i-1}-Gp_{i})^2+(Bp_{i-1}-Bp_{i})^2+(\alpha_{i-1}-\alpha_{i})^2$$
$$L_{6i}=(Rp_{i-1}-Rp_{i+1})^2+(Gp_{i-1}-Gp_{i+1})^2+(Bp_{i-1}-Bp_{i+1})^2+(\alpha_{i-1}-\alpha_{i+1})^2$$
$$L_{7i}=(Rp_{i-1}-Rp_{i+2})^2+(Gp_{i-1}-Gp_{i+2})^2+(Bp_{i-1}-Bp_{i+2})^2+(\alpha_{i-1}-\alpha_{i+2})^2$$
$$L_{8i}=(Rp_{i}-Rp_{i+1})^2+(Gp_{i}-Gp_{i+1})^2+(Bp_{i}-Bp_{i+1})^2+(\alpha_{i}-\alpha_{i+1})^2$$
$$L_{9i}=(Rp_{i}-Rp_{i+2})^2+(Gp_{i}-Gp_{i+2})^2+(Bp_{i}-Bp_{i+2})^2+(\alpha_{i}-\alpha_{i+2})^2$$
$$L_{10i}=(Rp_{i+1}-Rp_{i+2})^2+(Gp_{i+1}-Gp_{i+2})^2+(Bp_{i+1}-Bp_{i+2})^2+(\alpha_{i+1}-\alpha_{i+2})^2.$$

Where L_{1i} to L_{10i} represent Euclidean square distances, Rp_{i-2} to Rp_{i+2}, Gp_{i-2} to Gp_{i+2}, and Bp_{i-2} to Bp_{i+2} respectively represent color values of R, G, and B at the corresponding internal processing coordinates (x'-2,y'), (x'-1,y'), (x',y'), (x'+1,y'), (x'+2,y'), and α_{i-2} to α_{i+2} represent α values at the corresponding internal processing coordinates (x'-2,y'), (x'-1,y'), (x',y'), (x'+1,y'), (x'+2,y'). (Pg. 27, ln. 11 – Pg. 28, ln. 22)

The largest color space distance selecting unit 53 selects the largest value among the Euclidean square distance values L_{1i} to L_{10i} output from the color space distance calculating unit 52, and outputs the selected value L_i to the filtering necessity judging unit 43 as a dissimilarity level of the sub-pixel identified by the internal processing coordinates (x',y') to the surrounding sub-pixels. (Pg. 28, ln. 23 – Pg. 29, ln. 2).

Betrisey also does not teach or suggest the specific features recited in independent claims such as Claim 1:

> a filtering unit smoothing out color values of second-target-range sub-pixels of the composite image that correspond to the first-target-range sub-pixels, <u>by assigning weights, which are determined in accordance with the dissimilarity level</u>, to the second-target-range sub-pixels, and to overwrite the color values stored in the frame memory with color values of the composite image after smoothing out.

The Office Action cited to the combination of padding the character glyphs and the intermediate alpha value filtering as analysis of the pixels of the front image and filtering of the composite image corresponding to the pixels of the front image. However, padding a character glyph is not assigning weights to the second-target-range sub-pixels. In *Betrisey*, padding a character glyph does not affect the intermediate alpha values since the padding merely expands the size of the character glyphs. It prevents color leakage by having the intermediate alpha values be summed with the padding, which has alpha equal to a zero value and thus the intermediate alpha values are not affected or altered. (Col. 18, ln. 58 – Col. 19, ln. 3).

Furthermore, the box filter is a main process in *Betrisey* to combine images in the accuracy of sub-pixels. In contrast, in the present invention, the filtering process is a secondary process aimed at removing color drifts that occur as a display in the accuracy of sub-pixels is performed.

A person having ordinary skill in the arts would not selectively apply the box filters or selectively apply weights in accordance with the intermediate alpha values in the post cache filtering merely because *Betrisey* discloses that intermediate alpha values are used to determine whether the padding is necessary in the pre cache filtering. There is no teaching or suggestion within *Betrisey* that box filters should be selectively applied or that the intermediate alpha values are selectively applied. In *Betrisey*, the padding is done only when it is determined that there will be color leakage when creating the filtered intermediate alpha values from the intermediate

alpha values. In the case of padding, the intermediate alpha values are not altered, but rather it is summed with a zero value. This is done because box filtering is performed across all of the pixels rather than on selective portions.

Our recent discussion with Pinchus Laufer in the Office of Patent Legal Administration, who was involved in writing the Examination Guidelines for Determining Obviousness under 35 USC §103 in view of the Supreme Court decision in *KSR International Co. vs. Teleflex, Inc.* verified that the KSR decision still required a specific rationale that could not be based on hindsight for purportedly combining the elements in the prior art to meet an invention defined in the patent claims.

Mr. Laufer incorporated the following from the existing MPEP into the Guidelines.

As noted in the MPEP at §2143.02:

> A rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods <u>with no change in their respective functions</u>, and <u>the combination would have yielded nothing more than predictable results</u> to one of ordinary skill in the art. *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1395 (2007); *Sakraida v. AG Pro, Inc.*, 425 U.S. 273, 282, 189 USPQ 449, 453 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 62-63, 163 USPQ 673, 675 (1969); *Great Atlantic & P. Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152, 87 USPQ 303, 306 (1950). (underline added)

Betrisey also does not teach or suggest "in the smoothing out by the filtering unit, assignment of a larger weight causes a greater degradation of image." The Office Action claims the padding and the intermediate alpha values act as weights. While it is true that color leakage does not occur when the neighboring source image pixel segment has sample values of 0, there is no indication that a greater intermediate alpha value will cause color leakage even if color

leakage can be considered degradation of the image and there is no indication that it should. As seen in Fig. 10, the intermediate alpha values are merely summations of the sample values. (Col. 14, lns. 28 – 31). Furthermore, large alpha values do not mean that there will be a color leakage problem, even if color leakage problems were considered image degradation, and there is no indication that they should be considered so. Color leakage problems occur when pixels are located adjacent character glyph boundaries when filters that are used extend beyond character glyph boundaries. Therefore, pixels with large intermediate alpha values which are located away from character glyph boundaries do not experience color leakage problems. (Col. 15, lns. 2 – 24). Thus, larger intermediate alpha values do not mean that the image will be more degraded or have color leakage problems.

Furthermore, there is no indication that *Betrisey* attempts to solve the same problem. The present invention prevents degradation of images by reducing an amount of filtering done to the back image and thus reduces image degradation. *Betrisey*, however, is directed towards preventing blur, jaggedness, and other problems due to a lack of resolution stemming from the fact that pixels are treated as single entities. Although the Office Action claims on Pages 14 - 15 that Column 6, lines 40-42 outlines steps to avoid the repeated filtering of the entire contents of a glyph each time, such cessation of repeat filtering does not prevent the degradation of the image. The repeated filtering discussed in *Betrisey* involves refraining from performing the same calculations twice. As explained in Column 16, lines 12 - 21 and Colum 18, lines 4 – 8 of *Betrisey*, the filtering computations are performed and the resulting filtered output values are stored in a look-up table which is used to implement the filtering operation. Thus, the filtering computations do not need to be performed repeatedly in real time for each image being displayed. Therefore, the repeated filtering in *Betrisey* does not prevent the repeated filtering of

the image in terms of changing the pixel values and degrading the pixels, but instead only prevents the same calculations from being performed twice in order to save processor speed.

All arguments for patentability with respect to Claim 1 are repeated and incorporated herein for Claims 9 and 11.

The Office Action rejected Claims 2-4 under 35 U.S.C. § 103(a) as being unpatentable over *Betrisey et al.* in view of *Hill et al.* (U.S. 6,577,291).

Hill reduces aliasing associated with displaying relatively low resolution representations of text by exploiting the different intensity contributions by the red pixel, the green pixel, and the blue pixel to the human eye through a weighted scan conversion. (Col. 4, lns. 40-60; Col. 17, ln. 29 – Col. 18, ln. 5).

With respect to Claim 2, the Office Action admits that *Betrisey* does not teach or suggest "the calculation unit calculates a temporary dissimilarity level for each combination of the first-target-range sub-pixels, from color values of the first-target-range sub-pixels, and regards a largest temporary dissimilarity level among results of the calculation to be the dissimilarity level" and cites to Figure 9C *Hill* for the features of the present invention. However, *Hill* only discloses that a differential should be taken between a luminance value of a red sub-pixel of a pixel being processed and a luminance value of a green sub-pixel of a pixel being processed. If the differential is greater than a threshold value, then new luminance values are assigned to the red and green sub-pixels. (Col. 21, ln. 34 – Col. 22, ln. 34).

The Office Action states that dissimilarity levels which exceed the threshold are some of the largest dissimilarity levels because they are greater than the threshold. However, the fact that the dissimilarity levels between the red and green sub-pixels exceed a threshold does not automatically indicate that they are the largest dissimilarity level. First, a majority of the red and

green sub-pixels could have luminance differential between them that exceeds the threshold level in which case the fact that the luminance differential exceeds the threshold does not mean that it is one of the larger differential values or more specifically that it is the largest differential value as recited by the claim language. Furthermore, there is no indication within *Hill* or *Betrisey* that multiple dissimilarity levels should be calculated and that the largest one should be taken. As noted in Columns 21 and 22 of *Hill*, only one differential for luminance value is taken: the absolute value of $R_{CP} - G_{CP}$ prior to the comparison with the threshold value.

In contrast, in the present invention, a plurality of dissimilarity levels is calculated and the largest value is taken for purposes of comparing the dissimilarity level with a threshold value. (Pg. 39, ln. 27 – Pg. 40, ln. 19).

The Office Action rejected Claims 5, 10, and 12 under 35 U.S.C. § 103(a) as being unpatentable over *Betrisey et al.* in view of *McCormack et al.* (U.S. Pub. 2002/0097241).

All arguments for patentability with respect to Claim 1 are repeated and incorporated herein for Claims 5.

Furthermore, the Office Action admits that *Betrisey* does not teach or suggest "a calculation unit acquiring color values and transparency values of first-target-range sub-pixels that constitute a front image and are composed of a target sub-pixel and one or more adjacent sub-pixels that are adjacent to the target sub-pixel in the lengthwise direction of the pixel rows, and to calculate a dissimilarity level of the target sub-pixel to the one or more adjacent sub-pixels from the acquired color values and transparency values" and cites to *McCormack* for the features of the present invention.

McCormack reduces memory and processing bandwidth requirements of a computer graphics system by using a buffer in a graphics pipeline to merge selected image fragments before they reach a frame buffer. (¶ 0002).

The Office Action claims that *Betrisey* can be modified by McCormack to incorporate this color difference value into their color leakage prevention system for determining large color dissimilarities. However, as previously noted, color leakage and color dissimilarities are different from each other. Furthermore, there is no indication within *Betrisey* that using transparency values will improve the ability of *Betrisey* to reduce color leakage or determine when color leakage will occur to include padding. This is especially true considering that *McCormack* only discloses that the color dissimilarity levels are used to determine if two fragments can be merged as opposed to any type of filtering or adjustment of the actual sub-pixel values.

Applicant submits that any combination of references that must be modified beyond their functions is suggestive of an unintended use of hindsight that may have been utilized to drive the present rejection. This is particularly true for an examiner who is attempting to provide a diligent effort that only patentable subject matter occurs. The KSR Guidelines do not justify such an approach. There is still a requirement for the Examiner to step back from the zeal of the examination process and to appreciate that a Patent Examiner has to wear both hats of advocating a position relative to the prior art while at the same time objectively rendering in a judge-like manner a decision on the patentability of the present claims.

As set forth in MPEP 2142,

> To reach a proper determination under 35 U.S.C. §103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the

> invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

All arguments for patentability with respect to Claim 1 are repeated and incorporated herein for Claims 10 and 12.

Dependent Claims 2 – 4, 6 – 8, 15 - 20 depend from and further define Independent Claims 1, 5, 9, 10, 11, and 12 and are thus allowable, too.

The application is believed in condition for allowance. If there are any questions with regards to this response, the undersigned attorney can be contacted at the listed phone number.

Very truly yours,

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